

## Evaluation of Wastewater Chemicals as Indicators of Human Fecal Contamination

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The quality of drinking and recreational water is currently ascertained using indicator bacteria. The traditional tests that analyze for these bacteria require approximately 24 hours to complete and do not discriminate between human and animal sources. One solution is to use human wastewater chemicals, which would require shorter analysis times and are human specific. However, questions about the presence, persistence, fate, and transport of wastewater compounds must be answered before their utility as indicators of human fecal contamination can be determined. This information is being gathered through a series of projects, each designed to further the understanding of the behavior of these chemicals. The first steps were to determine what chemicals survive wastewater treatment and obtain information about their environmental occurrence and approximate persistence. This was accomplished by collecting an effluent sample and water samples up- and downstream from ten wastewater treatment plants. To further refine the persistence estimates, a dye tracer study was performed at two locations to determine the time it takes for a given parcel of water to travel from a wastewater treatment plant to successive downstream sampling points. By knowing the time of travel, the kinetics of the changes in concentration can be calculated. Knowing the environmental occurrence and persistence, the next step was to participate in the National Epidemiological and Environmental Assessment of Recreational (NEEAR) Water Study to determine whether there is a link between these chemicals and negative health impacts associated with exposure to waterborne pathogens. At the successful completion of this research effort, the U.S. EPA will have supplementary tools to monitor water for human wastewater contamination. The speed and specificity of the chemical analysis methods will protect humans from exposure to pathogens. In addition, occurrence information for numerous unregulated wastewater compounds will be obtained.

This effort compliments concurrent research within the NERL focused on developing rapid microbial detection methods. This project has relied heavily on both internal and external collaboration. The U.S. Geological Survey has been extensively involved in the collection and analysis of the surface samples for the chemical analytes. The NEEAR is a joint effort between the NERL and the National Health and Environmental Effects Research Laboratory.

Although this work was reviewed by the U.S. EPA and approved for publication, it may not necessarily reflect official Agency policy.